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merely by opening the throttle, as in the case of an automobile.

Professor Bedell's book shows an unusual gift for clean cut analysis and exposition; there are but few scientific or technical books that demonstrate these qualities in so high a degree.

The book does not attempt to extend the science of aeronautics. It is devoted primarily to a discussion of the problem of sustentation; the matter of stability is also treated, but in a qualitative way. It falls in a category between the popular book, superficial and inadequate, and the treatise, involved, and complicated. It is a book destined for a long and useful life.

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SPECIAL ARTICLES

A FURTHER NOTE ON WAR AND POPULATION¹

In a note published last summer² I drew attention to the course of the ratio

$$\frac{100 \text{ Deaths}}{\text{Births}}$$

in the principal belligerent countries of Europe between 1913 and 1918. All of the curves presented, with the single exception of that for Prussia, ended on a high point in 1918. The question was raised as to what would be their course after that year, and it was shown that England and Wales gave a value of 73 per cent. for 1919 against 92 per cent. for the high point in 1918. The first three quarters of the year 1920 give for England and Wales a value of 46.8 per cent. This is 10 points *lower* than the figure for 1913! For every death England had more than two births.

The *Journal Officiel* has recently published the 1919 figures for France (77 non-invaded departments only) to the following effect:

$$\frac{100 D}{B} = \frac{63569400}{413379} = 154 \text{ per cent.}$$

This figure compares (for the same territory)

¹ Papers from the Department of Biometry and Vital Statistics, school of hygiene and public health, Johns Hopkins University, No. 27.

² Pearl, R., SCIENCE, N. S., Vol. LI., pp. 553-596, 1920.

with 198 in 1918, 179 in 1917, 193 in 1916, 169 in 1915, 110 in 1914, and 97 in 1913. In other words, in the next year immediately following the cessation of hostilities France's death-birth ratio came back to less than that of 1915, the first whole year of the war. With an increase of 157 per cent. in marriages in 1919 over 1918 there seems little risk in predicting that 1920 will show a ratio not far from 100, which will be about the normal prewar status, France having had for some time a nearly stationary population. The 1920 vital index for France may well prove to be considerably below 100.

Another, and even more striking illustration of the exceedingly transitory effect of war upon the rate of population growth, is seen in the figures for the City of Vienna. Probably no large city suffered so severely from the war as did this capital. Yet observe what has happened, as set forth in Table I. To this table I have added, for the sake of rounding out the data of this and the former paper, the death-birth ratios of the United States Registration Area for as many years as they are available, and for England and Wales, 1912 to 1920 (first three quarters of latter year).

TABLE I
Percentage of Deaths to Births

Year	City of Vienna	U. S. Birth Registration Area	England and Wales
1912	80	—	56
1913	85	—	57
1914	86	—	59
1915	113	56	69
1916	143	59	65
1917	195	57	75
1918	229	73	92
1919	162	58	73
1920	—	—	47 ³

These figures are shown graphically in Figure 1.

We note that:

1. The high point of the Vienna curve in 1918, 229 per cent., is higher than that for France (198 per cent.), and probably higher than for any other equally large aggregate of population in the world.

³ First three quarters of year only.

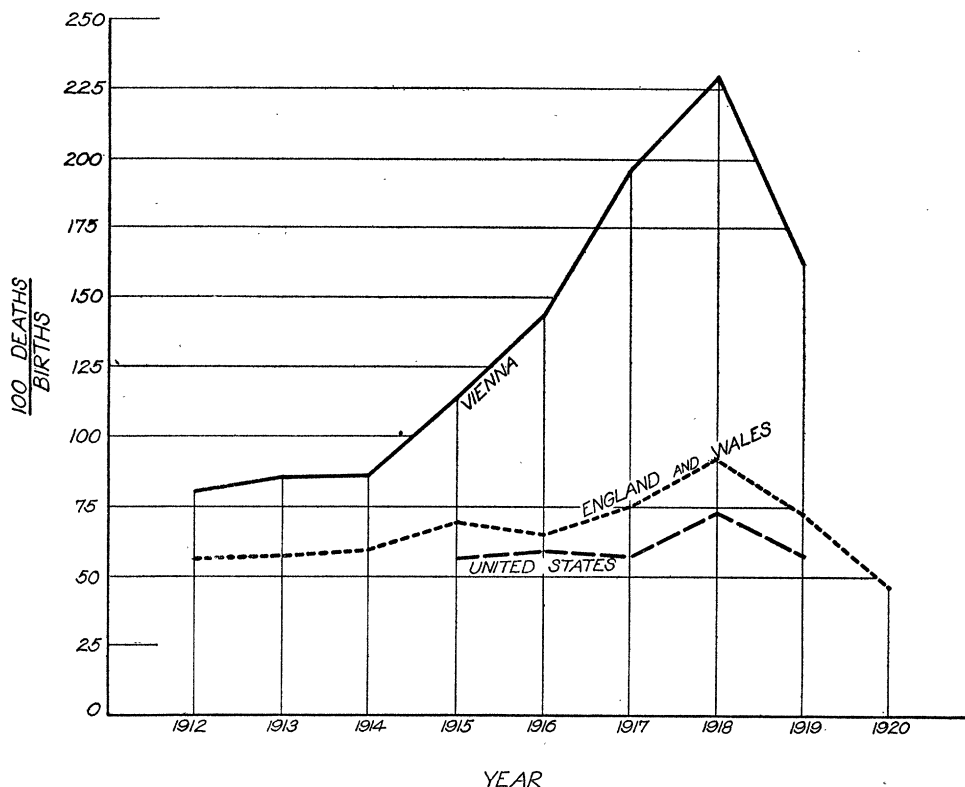


FIG. 1. Showing the change in percentage which deaths were of births in each of the years 1912 to 1919 for Vienna (—); 1915 to 1919 for the United States (— —); and 1912 to 1920 for England and Wales (-----).

2. The drop in 1919 is sharp in its angle and marked in its amount, the percentage coming down nearly to the 1916 figure—and this in spite of the very distressing conditions which prevailed in Vienna throughout 1919. It is not at all improbable, indeed rather it is probable that Vienna will in 1920 show a ratio under 100—that is, more births than deaths. If this happens she will have begun absolute natural increase again in only the second year after the cessation of hostilities, during the last year of which she had 2½ persons die for every one born.

3. The war produced no effect upon the death-birth ratio in this country, as would have been expected. The influenza epidemic in 1918 raised the curve a little, but it promptly dropped back to normal in 1919.

4. In England and Wales the provisional fig-

ure indicates that 1920 will show a lower vital index than that country has had for many years.

Altogether, these examples, which include the effects of the most destructive war known to modern man, and the most devastating epidemic since the Middle Ages, furnish a substantial demonstration of the fact that population growth is a highly self-regulated biological phenomenon. Those persons who see in war and pestilence any absolute solution of the world problem of population, as postulated by Malthus, are optimists indeed. As a matter of fact, all history definitely tells us, and recent history fairly shouts in its emphasis, that such events make the merest ephemeral flicker in the steady onward march of population growth.

RAYMOND PEARL